A UNITED STATES DEPARTMENT OF COMMERCE PUBLICATION

NBS PRODUCT STANDARD
PS 10-69

WITHDRAWN

Polyethylene (PE) Plastic Pipe (Schedule 40—Inside Diameter Dimensions)

A VOLUNTARY STANDARD DEVELOPED BY THE NATIONAL BUREAU OF STANDARDS IN COOPERATION WITH PRODUCERS, DISTRIBUTORS AND USERS.

For sale by the Superintendent of Documents
U.S. Government Printing Office, Washington, D.C. 20402.
(Order by SD Catalog No. C 13.20/2:10–69). Price 15 cents.

PRODUCT STANDARDS

Product Standards are published voluntary standards that establish (1) dimensional requirements for standard sizes and types of various products, (2) technical requirements for the product, and (3) methods of testing, grading, and marking these products. The objective is to define requirements for these products in accordance with the principal demands of the trade. *Product Standards* are published by the National Bureau of Standards of the U.S. Department of Commerce.

Development of a PRODUCT STANDARD

The Bureau's Office of Engineering Standards Services works closely with business firms, trade organizations, testing laboratories, and other appropriate groups to develop such standards. (A group interested in developing a Product Standard may submit a written request to the Office of Engineering Standards Services, National Bureau of Standards.) After determining that the desired standard would be technically feasible and in the public interest, a specific proposal is developed in consultation with interested trade groups and circulated for industry consideration and comment.

Subsequently, a Standard Review Committee is established to review the proposed standard for conformance with the Department of Commerce procedures. The committee includes qualified representatives of producers, distributors, and users or consumers of the product. When approved by the committee, copies of the recommended standard are distributed for consideration and acceptance. When the acceptances show general agreement by all segments of the industry, and when there is no substantive objection deemed valid by the National Bureau of Standards, the Bureau announces approval of the Product Standard and proceeds with its publication.

Use of a PRODUCT STANDARD

Product Standards are developed for the maximum use of industry by ensuring that producers, distributors, and users or consumers cooperate in the development of a voluntary Product Standard. The adoption and use of a Product Standard is *voluntary*. Product Standards are used most effectively in conjunction with legal instrumentalities such as building codes, purchase orders, and sales contracts. When a standard is made part of such a contract, compliance with the standard is enforceable by the buyer or the seller along with other provisions of the contract. There is *no* governmental regulation or control involved.

Purchasers may order products that comply with Product Standards and determine for themselves that their requirements are met. More often, manufacturers refer to the standards in sales catalogs, advertising, invoices, and labels on the product. Commercial inspection and testing programs are also employed for greater effectiveness together with grade labels, hallmarks and certificates. Such assurance of compliance promotes confidence and understanding between buyers and sellers.

EFFECTIVE DATE

Having been passed through the regular procedures of the Office of Engineering Standards Services, National Bureau of Standards and approved by the acceptors hereinafter listed in part, this Product Standard is issued by the National Bureau of Standards, effective

March 1, 1969.

Nat. Bur. Stand. (U.S.), Prod. Stand. 10–69, 14 pages (Mar. 1970)

CODEN: XNPSA

Product Standard PS 10–69

Supersedes Commercial Standard CS 197–60

Polyethylene (PE) Plastic Pipe (Schedule 40—Inside Diameter Dimensions)

Effective March 1, 1969

1. PURPOSE

1.1. The purpose of this Product Standard is to establish nationally recognized dimensions and significant quality requirements for polyethylene (PE) plastic pipe when it is made in Schedule 40 size with the inside diameter controlled. This Standard is also intended to provide producers, distributors, engineers, code officials, and users with a basis for common understanding of the characteristics of this product.

2. SCOPE AND CLASSIFICATION

2.1. Scope—This Product Standard covers the principal materials, sizes, and pressure ratings for commercially available PE plastic pipe made in Schedule 40 size with the inside diameter controlled for use with insert fittings. Included are requirements and methods of test for materials, workmanship, dimensions, sustained pressure, burst pressure, and environmental stress cracking. Methods of marking and labeling to indicate compliance with this Standard are also provided.[1]

2.2. Classification—The PE plastics material and pipe covered by this Product Standard are classified as follows:

2.2.1. Material—PE plastics used to make pipe meeting the requirements of this Standard are categorized by means of two criteria, namely, short-term strength tests and long-term strength tests.

2.2.1.1. Basic materials—This Standard covers pipe made from four PE plastics as defined in the American Society for Testing and Materials (ASTM)[2] D1248–69, *Standard Specification for Polyethylene Plastics Molding and Extrusion Materials*,[3] in which the requirements are based on short-term tests. These are P 14; P 23; P 33; and P 34.

2.2.1.2. Hydrostatic design stresses—This Standard covers pipe made from PE plastics as defined by three hydrostatic design stresses developed on the basis of long-term tests.[4] These hydrostatic design stresses are 400, 500, and 630 psi for water at 23° C (73.4° F) and apply only to pipe meeting all the requirements of this Standard.

[1] Information regarding the properties, applications, installations, and maintenance of polyethylene plastic piping is contained in Technical Report PPI–TR8–APR 1968, Installation Procedures for Polyethylene (PE) Plastic Pipe, published by the Plastics Pipe Institute, 250 Park Avenue, New York, New York 10017.

[2] Copies of ASTM publications are obtainable from the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.

[3] Later issues of all publications specified in this Product Standard may be used providing the requirements are applicable and consistent with the issues designated.

[4] Information regarding the method of test and other criteria used in developing these hydrostatic design stresses may be obtained from the Plastics Pipe Institute (PPI), a Division of the Society of the Plastics Industry, 250 Park Avenue, New York, New York 10017.

2.2.1.3. Pipe materials—This Standard covers pipe made from five PE plastic pipe materials coded as follows:

(1) P 14, with a hydrostatic design stress of 400 psi for water at 23° C (73.4° F), designated as PE1404.

(2) P 23, with a hydrostatic design stress of 500 psi for water at 23° C (73.4° F), designated as PE2305.

(3) P 23, with a hydrostatic design stress of 630 psi for water at 23° C (73.4° F), designated as PE2306.

(4) P 33, with a hydrostatic design stress of 630 psi for water at 23° C (73.4° F), designated as PE3306.

(5) P 34, with a hydrostatic design stress of 630 psi for water at 23° C (73.4° F), designated as PE3406.

2.2.2. Pipe pressure rating (PR)—Pipe meeting the requirements of this Standard is rated for use with water at 23° C (73.4° F) at the maximum internal pressure shown in table 1. These ratings have been calculated in accordance with the International Standards Organization [5] (ISO) equation as defined in 5.1.3. Lower ratings may be recommended at the option of the pipe manufacturer. The sustained pressure requirements, 3.4.1, are related to these ratings through the slopes of the strength-time plots for the materials in pipe form.

TABLE 1. *Pressure ratings for water at 23° C (73.4° F) for PE plastic pipe, Schedule 40*

Nominal pipe size	Pressure ratings [a]		
	PE2306 [b] PE3306 PE3406	PE2305 [b]	PE1404 [b]
inch	*psi*	*psi*	*psi*
½	190	150	120
¾	150	120	100
1	140	110	90
1¼	120	90	70
1½	100	80	70
2	90	70	60
2½	100	80	60
3	80	70	50
4	70	60	NPR [c]
6	60	NPR [c]	NPR [c]

[a] These pressure ratings apply only to unthreaded pipe. The industry does not recommend threading PE plastic pipe.
[b] See 2.2.1.3 and 5.1.4 for code designation.
[c] NPR = not pressure rated.

3. REQUIREMENTS

3.1. General—All pipe represented as complying with this Standard shall meet all of the requirements listed herein and shall be marked as specified in section 6.

3.2. Materials—The PE plastic extrusion compound shall meet the requirements of either P 14, Class C; P 23, Class C; P 33, Class C; or P 34, Class C, materials as described in ASTM D1248–69.

3.2.1. Rework material—Clean rework material generated from the manufacturer's own pipe production may be used by the same

[5] Address: 1430 Broadway, New York, New York 10018, c/o American National Standards Institute.

manufacturer provided that the types of material specified in 3.2 are not mixed with one another and that the pipe produced meets all the requirements of this Standard.

3.2.2. Carbon black—The PE pipe compound shall contain at least 2 percent carbon black when tested in accordance with 4.9. For pipe produced by simultaneous multiple extrusion, this requirement shall apply only to the outer layer. [6]

3.2.3. Density—The PE base resin (uncolored PE) in the pipe compound shall have a density in the range of 0.910 to 0.925 g/cm ^{3} for pipe made from P 14; 0.926 to 0.940 g/cm ^{3} for pipe made from P 23; and 0.941 to 0.965 g/cm ^{3} for pipe made from P 33 and P 34, when determined in accordance with 4.5.

3.3. Pipe dimensions and tolerances—

3.3.1. Inside diameters—The average inside diameters shall be as shown in table 2 when measured in accordance with 4.4 and 4.4.1.

3.3.2. Wall thickness—The wall thicknesses shall be as shown in table 2 when measured in accordance with 4.4 and 4.4.2.

3.3.3. Wall thickness range—The wall thickness range (eccentricity of the inside and outside circumferences) of the pipe shall not exceed 12 percent when measured in accordance with 4.4 and 4.4.3.

3.3.4. Thickness of outer layer—For pipe produced by simultaneous multiple extrusion, that is, pipe containing two or more concentric layers, the outer layer shall be at least 0.020 inch thick.

TABLE 2. *Inside diameters and wall thicknesses for PE plastic pipe, Schedule 40*

Nominal pipe size	Average inside diameter		Wall thickness	
inch	Average *inch*	Tolerance *inch*	Minimum *inch*	Maximum [a] *inch*
½	0.622	+0.010 −.010	0.109	0.129
¾	0.824	+.010 −.015	.113	.133
1	1.049	+.010 −.020	.133	.153
1¼	1.380	+.010 −.020	.140	.160
1½	1.610	+.015 −.020	.145	.165
2	2.067	+.015 −.020	.154	.174
2½	2.469	+.015 −.025	.203	.227
3	3.068	+.015 −.030	.216	.242
4	4.026	+.015 −.035	.237	.265
6	6.065	+.020 −.035	.280	.314

[a] This is limited by the wall thickness range requirements, see 3.3.3.

[6] There is evidence that indicates that type, particle size, and dispersion quality of the carbon black does affect the weatherability of the pipe. The problem is being investigated by the Plastics Pipe Institute (PPI) and when reliable test methods are developed, requirements for weatherability, or other suitable requirements to cover this property, will be included in a revision of this Product Standard.

3.4. Performance requirements—

3.4.1. Sustained pressure—The pipe shall not fail, balloon, burst, or weep as defined in section 4, ASTM D1598–67, *Standard Method of Test for Time-to-Failure of Plastic Pipe Under Long-Term Hydrostatic Pressure,*[7] at the test pressures given in table 3 when tested in accordance with 4.6.

3.4.2. Burst pressure—The minimum burst pressure of the pipe shall be as given in table 4, when determined in accordance with 4.7.

TABLE 3. *Sustained pressure test conditions for water for PE plastic pipe, Schedule 40*

Nominal pipe size	Pressure [a] required for test					
	37.8°C (100°F)			23°C (73.4°F)		
	PE2306 PE3306 PE3406	PE2305	PE1404	PE2306 PE3306 PE3406	PE2305	PE1404
inch	*psi*	*psi*	*psi*	*psi*	*psi*	*psi*
½	320	250	170	390	310	240
¾	260	210	140	320	250	200
1	240	190	130	300	240	180
1¼	200	160	100	240	190	150
1½	180	140	90	220	170	140
2	150	120	80	180	150	110
2½	160	130	90	220	160	120
3	150	110	70	170	140	110
4	120	90	60	150	120	90
6	90	80	50	120	90	70

[a] The fiber stresses (hoop stresses) used to derive these test pressures are as follows:

At 37.8 °C (100 °F) PE2306, PE3406, and PE3306 – 1070 psi
PE2305 – 850 psi
PE1404 – 570 psi

At 23 °C (73.4 °F) PE2306, PE3406, and PE3306 – 1320 psi
PE2305 – 1050 psi
PE1404 – 820 psi

TABLE 4. *Burst pressure requirements for water at 23° C (73.4° F) for PE plastic pipe, Schedule 40*

Nominal pipe size	Minimum burst pressure [a]		
	PE2306 PE3306 PE3406	PE2305	PE1404
inch	*psi*	*psi*	*psi*
½	750	600	370
¾	610	480	300
1	570	450	280
1¼	460	370	230
1½	420	330	210
2	350	280	170
2½	380	300	190
3	330	260	160
4	280	220	140
6	220	180	110

[a] The fiber stresses (hoop stresses) used to derive these test pressures are as follows:

PE2306, PE3406, and PE3306 – 2520 psi
PE2305 – 2000 psi
PE1404 – 1250 psi

[7] See footnotes 2 and 3, page 1.

3.4.3. Environmental stress cracking—There shall be no loss of pressure in the pipe when tested in accordance with 4.8.

3.4.4. Bond—For pipe produced by simultaneous multiple extrusion, the bond between the layers shall be strong and uniform. It shall not be possible to separate any two layers with a probe or point of a knife blade so that the layers separate cleanly at any point.

3.5. Workmanship—The pipe shall be homogeneous throughout and free from visible cracks, holes, foreign inclusions, or other defects. The pipe shall be uniform in color, opacity, density, and other physical properties.

3.6. Approval for potable water—All pipe intended for use with potable water shall meet the requirements for that purpose specified by the National Sanitation Foundation Testing Laboratory, Inc.[8], or specified by other organizations accredited by Federal or State Public Health agencies as having requirements for that purpose which are no less stringent than those of the National Sanitation Foundation Testing Laboratory, Inc.

4. INSPECTION AND TEST PROCEDURES

4.1. Test conditions—Tests shall be conducted in a standard laboratory atmosphere of 23 ±2° C (73.4 ±3.6° F) and 50 ±5 percent relative humidity.

4.2. Conditioning test specimens—The test specimens shall be conditioned at 23 ±2° C (73.4 ±3.6° F) and 50 ±5 percent relative humidity for not less than 48 hours prior to test in accordance with Procedure A in ASTM D618–61, *Standard Methods of Conditioning Plastics and Electrical Insulating Materials for Testing*,[9] unless otherwise specified in this Standard.

4.3. Dimensions—Measurements shall be made in accordance with ASTM D2122–67, *Standard Method of Determining Dimensions of Thermoplastic Pipe*.[9]

4.3.1. Inside diameter—The inside diameter of the pipe shall be measured with a tapered plug gage in accordance with section 5 of ASTM D2122–67.

4.3.2. Wall thickness—Micrometer measurements of the wall thickness shall be made in accordance with section 4 of ASTM D2122–67, to determine the maximum and minimum values. The wall thickness shall be measured at both ends of the pipe to the nearest 0.001 inch.

4.3.3. Wall thickness range—The measurements shall be made in a manner such that the maximum, A, and the minimum, B, wall thicknesses of each cross section measured are obtained. The wall thickness range, E, shall be calculated for each cross section as follows:

$$E, \%, = \frac{A - B}{A} \times 100$$

The wall thickness range shall not exceed 12 percent for any cross section measured.

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[8] Address: The National Sanitation Foundation Testing Laboratory, Inc., 2355 West Stadium Boulevard, Ann Arbor, Michigan 48106.

[9] See footnotes 2 and 3, page 1.

4.4. Density—The density of the pipe compound shall be determined in accordance with ASTM D1505–68, *Standard Method of Test for Density of Plastics by the Density-Gradient Technique,*[10] or ASTM D792–66. *Standard Methods of Test for Specific Gravity and Density of Plastics by Displacement,*[10] using three specimens. The percent of carbon black by weight shall be determined in accordance with 4.9. The density of the PE base resin (uncolored PE) in the pipe compound shall be calculated as follows:

Density of resin in g/cm^3 = Density of pipe compound in g/cm^3 minus (0.0044 × % of carbon black by weight).

4.5. Sustained pressure test—Twelve specimens of pipe, each bearing the required permanent marking, shall be tested. The length of each specimen shall be at least 10 times the nominal diameter of pipe with the exception that no specimen shall be less than 10 inches or more than 3 feet between end closures. Six specimens shall be tested at 37.8 °C (100 °F)under the pressures established in table 4; and the remaining six specimens shall be tested at 23 °C (73.4 °F) under the pressures established in table 4. The specimens shall be conditioned for at least two hours prior to the test in an atmosphere which is held to within ± 2 °C (±3.6 °F) of the specified test temperatures. The temperature of the water during the test shall be maintained within ±2 °C (±3.6 °F) of the specified temperature. The test shall be in accordance with ASTM D1598–67, except that the pressure shall be maintained at the values given in table 4 for 1,000 hours. Pressure shall be held as closely as possible, but within ± 10 psi. Failure of any two of the six specimens tested at a given temperature shall constitute noncompliance with this Standard. Failure of one of the six specimens tested at a given temperature will require a test of six additional specimens at that temperature. The failure of one of the six specimens evaluated in the retest shall constitute noncompliance with this Standard. Evidence of failure of the pipe shall be as defined in section 4, ASTM D1598–67, as follows:

Failure—Any continuous loss of pressure resulting from the transmission of the test liquid through the body of the specimen under test.

Ballooning—Any abnormal localized expansion of a pipe specimen while under internal hydraulic pressure.

Bursting—Failure by a break in the pipe with immediate loss of test liquid and continued loss at essentially no pressure.

Seepage or weeping—Failure that occurs through essentially microscopic breaks in the pipe wall, frequently only at or near the test pressure. At lower pressures the pipe may carry liquids without evidence of loss of the liquids.

4.6. Burst pressure—The minimum burst pressure shall be determined with at least five specimens in accordance with ASTM D1599–62T, *Tentative Method of Test for Short-Time Rupture Strength of Plastic Pipe, Tubing, and Fittings.*[10] The time of

[10] See footnotes 2 and 3, page 1.

testing to failure for each specimen shall be between 60 and 90 seconds. This test may be made at other than the standard test temperature, 23 ±2 °C (73.4 ±3.6 °F), in which case the minimum burst pressure requirements shall be adjusted in accordance with the conversion factor or the equations given in table 5. In case of disagreement, the standard test temperature shall be used.

TABLE 5. *Conversion*[a] *of burst pressure requirements for PE plastic pipe, Schedule 40, table 4 to equivalent burst pressures at other temperatures*

Test temperature		Conversion factor, r
C	F	
10.0	(50)	1.18
12.9	(55)	1.14
15.6	(60)	1.10
18.3	(65)	1.06
21.1	(70)	1.03
23.0	(73.4)	1.00
23.9	(75)	0.98
26.7	(80)	.92
29.4	(85)	.87
32.2	(90)	.81
35.0	(95)	.75
37.8	(100)	.70

[a] The equations relating temperature to the conversion factor are as follows:

Celsius (Centigrade) Scale	Fahrenheit Scale
Above 23.0°, $T_C = 72 - 49r$	Above 73.4°, $T_F = 162 - 88.6r$
Below 23.0°, $T_C = 95 - 72r$	Below 73.4°, $T_F = 207 - 133.6r$

When r is calculated it shall be rounded off to the nearest 0.01.

4.7. Environmental stress cracking test—Six randomly selected 10-inch-long specimens containing the permanent marking (see 6.1) shall be used for this test. One end of each specimen shall be connected to a 400-psi pressure gauge and the other end shall be connected to an air or nitrogen supply through a suitable valve. The specimens shall be subjected to the pressures listed in table 3 for 23° C and then the valve closed and disconnected in such a manner that the pressure is retained in the specimen. Enough pressure in excess of the listed value shall be applied to compensate for the pressure lost during disconnection of the pressure source. The assembly shall be tested for leaks by immersion in water. Leaks shall be eliminated or non-leaking specimens substituted for those that leak. Care shall be taken to completely dry the test specimen and then a coating of IGEPAL CO 630,[11] or equal, shall be applied to the pipe surface with a brush. Care shall be taken to keep the IGEPAL at least one-half inch but not more than one inch away from the clamps used on each end of the pipe. Fresh reagent shall be used for each test and care shall be taken to store reagent in closed containers because it is hygroscopic. The coated pipe assembly shall be kept at room temperature for three hours and then examined. There shall be no loss of pressure in at least four of the six specimens. Specimens that leak at a connection shall be discarded and retests made. Loss of pressure caused by expansion of the pipe shall not be cause for rejection.

[11] The use of the name IGEPAL CO 630 is solely for the purpose of description and other products equal in performance will be acceptable. IGEPAL CO 630 may be obtained from the General Aniline and Film Corporation, Dyestuff and Chemical Division, 140 W. 51st Street, New York, New York 10020.

4.8. Carbon black—The carbon black content of the pipe, or of the outer layer of pipe produced by simultaneous multiple extrusion, shall be determined in accordance with ASTM D1603–68, *Standard Method of Test for Carbon Black in Ethylene Plastics.*[12]

5. DEFINITIONS

5.1. General—Definitions and abbreviations are in accordance with ASTM D883–69, *Standard Nomenclature Relating to Plastics;*[12] ASTM D1600–69, *Standard Abbreviations of Terms Relating to Plastics* [12] and Plastics Pipe Institute [13] Technical Report PPI–TRI–NOV 1968, *A Glossary of Plastics Piping Terms.*[14]

5.1.1. Hydrostatic design stress—The estimated maximum tensile stress in the wall of the pipe in the circumferential orientation due to internal hydrostatic water pressure that can be applied continuously with a high degree of certainty that failure of the pipe will not occur.

5.1.2. Pressure rating (PR)—The estimated maximum pressure that water in the pipe can exert continuously with a high degree of certainty that failure of the pipe will not occur.

5.1.3. Relation between dimensions, design stress, and pressure rating—The following expression, commonly known as the ISO equation (see ISO R161–1960, *Pipes of Plastic Materails for the Transport of Fluids*),[14,15] is used in this Product Standard to relate dimensions, design stress, and pressure rating:

$$\frac{2S}{P} = \frac{ID}{t} + 1$$

Where S = design stress, psi
P = pressure rating, psi
ID = average inside diameter, inches
t = minimum wall thickness, inches

5.1.4. Standard thermoplastic pipe materials designation code—The pipe materials designation code consists of the abbreviation PE for the type of plastic, followed by the ASTM material designations (arabic numerals) and the design stress in units of 100 psi with any decimal figures dropped. When the design stress code contains less than two figures, a zero is used before the number. Thus a complete material code consists of two letters and four figures. See 2.2.1.3.

6. MARKING

6.1. Mandatory marking—Marking on the pipe shall include the following, spaced at inetrvals of not more than five feet:

(1) The nominal pipe size (e.g., 2″).

(2) The type of plastic pipe material in accordance with the designation code (e.g., PE2305).

(3) Schedule 40 and the pressure rating in psi for water

[12] See footnotes 2 and 3, page 1.
[13] A division of The Society of the Plastics Industry, 250 Park Avenue, New York, New York, 10017.
[14] See footnote 3, page 1.
[15] See footnote 5, page 2.

at 23 °C (73.4 °F), (e.g., 100 psi). When the indicated pressure rating is lower than that calculated in accordance with 5.1.3 (see 2.2.2) this shall be indicated by placing a star after the pressure rating.

(4) This Product Standard designation PS 10–69.

(5) The manufacturer's name (or trademark) and code.

(6) Pipe intended for use with potable water shall include the seal of approval (or "nSf" mark) of the National Sanitation Foundation Testing Laboratory, Inc., or of some other testing laboratory accredited by Federal or State Public Health agencies. (See 3.6). This marking shall be spaced at intervals required by the organization establishing the specifications.[16]

7. IDENTIFICATION

7.1. Labels and literature—In order that purchasers may identify products complying with the requirements of this voluntary Product Standard, producers choosing to produce such products in compliance with this voluntary Standard may include a statement in conjunction with their name and address on labels, invoices, sales literature, and the like. The following statement is suggested when sufficient space is available:

> This polyethylene plastic pipe conforms to the requirements established in Product Standard PS10–69, developed cooperatively with the industry and published by the National Bureau of Standards under the voluntary Product Standards procedures of the U.S. Department of Commerce. Full responsibility for the conformance of this product with the standard is assumed by (name and address of producer or distributor).

The following abbreviated statement is suggested when available space on labels is insufficient for the full statement:

> Conforms to PS 10–69, (name and address of producer or distributor).

8. HISTORY

8.1. On November 2, 1953, the Society of the Plastics Industry, Inc., requested the assistance of the Department of Commerce in the establishment of standard dimensions for flexible polyethylene plastic pipe. With the assistance and cooperation of the industry, standard dimensions were developed and were published on October 15, 1954, as Commercial Standard CS 197–54. On April 15, 1957, the Standard was revised to add two additional series of wall thickness, quality requirements, and test methods, and was republished as CS 197–57. On March 1, 1959, a second revision was published as CS 197–59 to add to the Standard working pressures and pressure rating tests. Again, on September 1, 1960, the Standard was revised to include three types of pipe based on the density of the basic resins. The Commercial Standard was then designated CS 197–60.

[16] Manufacturers using the seal of approval of an accredited testing laboratory must obtain authorization from the laboratory concerned.

8.2. Current revision—On July 11, 1967, approval was granted to process a revision of CS 197–60 in accordance with the *Procedures for the Development of Voluntary Product Standards* as published by the Department of Commerce on December 10, 1965. This revision was submitted to the National Bureau of Standards by the Plastics Pipe Institute of the Society of the Plastics Industry, Inc., to bring the Standard up to date through the incorporation of advanced technical knowledge regarding polyethylene plastic pipe.

With unanimous approval of its reconstituted Standing Committee, public announcement was made and the recommended Product Standard was widely circulated on November 12, 1968, for consideration and acceptance. The response to this circulation recorded sufficient acceptance from producers, distributors, and users of polyethylene plastic pipe to indicate success of the project.

Accordingly, in February 1969, PS 10–69, *Polyethylene (PE) Plastic Pipe (Schedule 40—Inside Diameter Dimensions)*, was announced to become effective on March 1, 1969.

Technical Standards Coordinator—Herbert A. Philo, Product Standards Section, Office of Engineering Standards Services, National Bureau of Standards, Washington, D.C. 20234.

9. STANDING COMMITTEE

9.1. The following individuals comprise the membership of the Standing Committee which is to review all revisions proposed to keep this Standard abreast of progress. Comments concerning the Standard and suggestions for revision may be addressed to any member of the committee or to the Office of Engineering Standards Services, National Bureau of Standards, U.S. Department of Commerce, which acts as secretary for the committee.

Representing Producers

Frank J. Furno (Chairman), Celanese Plastics Company, 142 Parsons Avenue, Columbus, Ohio 43215

John J. Lainson, Western Plastics Corporation, 1515 West Second Street, Hastings, Nebraska 68901

Frank W. Reinhart, Plastics Pipe Institue, 9918 Sutherland Road, Silver Spring, Maryland 20901

Jeryl H. Zirkelbach, Cresline Plastic Pipe Company, Inc., 955 Diamond Avenue, Evansville, Indiana 47717

Paul F. Finn, Arizona Plastics Extrusion Company, 2547 West Jackson Street, Phoenix, Arizona 85009

Representing Distributors

W. K. Klein, Joseph T. Ryerson & Son, Inc., Post Office Box 8000–A, Chicago, Illinois 60680

Eugene J. Linsky, Tampa Wholesale Plumbing Supply Corp., 205 Brush Street, Tampa, Florida 33606

H. W. Pinson, Beck and Gregg Hardware Company, 217 Luckie Street, Atlanta, Georgia 30303

Harold Stein, Torrington Supply Company, Inc., 125 Maple Street, Waterbury, Connecticut 06720

Representing Users

Byron R. Eplett, National Association of Plumbing-Heating-Cooling Contractors, 544 Grove Avenue, Johnstown, Pennsylvania 15902

Euclid Faneuf, Whirlpool Corporation, Whirlpool Research and Engineering Center, Monte Road, Benton Harbor, Michigan 49022

C. S. Perkins, Union Oil Company of California, Union Oil Center, Los Angleles, California 90017

C. B. F. Young, Cracker Asphalt Corporation, Post Office Box Drawer 775, Douglasville, Georgia 30134

General Interest

R. N. Bowen, National Sanitation Foundation Testing Laboratory, Inc., 2355 West Stadium Boulevard, Ann Arbor, Michigan 48106

Robert E. Lyons, General Services Administration, Federal Supply Service, Standardization Division, Washington, D.C. 20405

W. K. Rodman, Department of Housing and Urban Development, Federal Housing Administration, Washington, D.C. 20411

G. C. Sherlin, Building Research Division, National Bureau of Standards, Washington, D.C 20234

10. ACCEPTORS

10.1. The manufacturers, distributors, users, and others listed below have individually indicated in writing their acceptance of this Product Standard prior to its publication. The acceptances indicate an intention to utilize the Standard as far as practicable, reserving the right to depart from it as may be deemed advisable. The list is published to show the extent of recorded public support for the Standard.

ASSOCIATIONS
(General Support)

American Institute of Supply Associations, Inc., Washington, D.C.
Central Supply Association, Chicago, Illinois
Mobile Homes Manufacturers Association, Chicago, Illinois
National Building Material Distributors Association, Chicago, Illinois
National Sanitation Foundation, Ann Arbor, Michigan
Plastics Pipe Institute, New York, New York

PRODUCERS

Anesite Division, Clow Corporation, Chicago, Illinois
Allied Chemical Corporation, Morristown, New Jersey
Busada Manufacturing Corporation, Flushing, New York
Carlon Products Division of Continental Oil Company, Aurora, Ohio
Celanese Plastics Company, Hilliard, Ohio
Continental Plastics Industries, Inc., Denver, Colorado
Cresline Plastic Pipe Company, Inc., Evansville, Indiana
Crown-Line Plastics, Inc., Hamburg, Iowa
Electric Hose and Rubber Company, Wilmington, Delaware
Flintkote Company, The, Orangeburg, New York
Four D Manufacturing Company, Glenville, West Virginia
Glamorgan Pipe and Foundry Company, Lynchburg, Virginia
Goodall Rubber Company, Trenton, New Jersey
Kerona Plastic Extrusion Company, Stockton, California
Moore Plastic Industries, Inc., Los Angeles, California
Moore Manufacturing Inc., Brisbane, California
Nebraska Plastics, Inc., Cozad, Nebraska
Olin Evanite Plastics, Penacook, New Hampshire
Phillips Products Company, Inc., Bartlesville, Oklahoma
Portco Corporation, Vancouver, Washington
Sedco Corporation, Auburndale, Florida
Simpson Timber Company, Eugene, Oregon
Taylor Plastics, Inc., Howell, Michigan
Vistron Corporation, Plastex Division, Columbus, Ohio
Western Plastics Corporation, Hastings, Nebraska

FIRMS AND OTHER INTERESTS

Aetna Engineering Company, Ashaway, Rhode Island
Allied Chemical Corporation, Morristown, New Jersey
Amoco Chemical Corporation, Stow, Ohio
Anderson, Ted. D., Company, Kokomo, Indiana
Ashton, Brazier, Montmorency and Associates Architects, Salt Lake City, Utah
Barclay, Ayers and Bertsch Company, Grand Rapids, Michigan
Beible's Pump and Supply, Inc., Emmaus, Pennsylvania
Belli and Belli, Architects, Chicago, Illinois
Berg Construction Company, Inc., Juneau, Alaska
Bogina and Associates, Consulting Engineers, Lenexa, Kansas
Camlet, J. Thomas and Son, Architects and Engineers, Clifton, New Jersey
Cannon and Mullen, Architects, Salt Lake City, Utah
Can-Tex Plastics, Mineral Wells, Texas
Colonial Plastics, Tampa, Florida
Columbia Gas of Ohio, Inc., Columbus, Ohio
Cracker Asphalt Corporation, Douglasville, Georgia
Federal Corporation, Oklahoma City, Oklahoma
Forsythe, Bergemann, and Vanek, Architects, Canton, Ohio
Garden State Wholesale, Inc., Camden, New Jersey
Genova Products, Davison, Michigan
Kathan and Son, General Contractors, Inc., Onalaska, Wisconsin
Kemp, Bunch, and Jackson, Architects, Jacksonville, Florida
Kendall, J. B., Company, Washington, D.C.
Melbourne, George F. S. and Associates, Canton, Ohio
Madsen and Howell, Inc., Perth Amboy, New Jersey
M & H Rubber and Supply Inc., Perth Amboy, New Jersey
Panhandle Eastern Pipe Line Company, Kansas City, Missouri
Plastiline, Inc., Pompano Beach, Florida
Ryerson, Joseph T. and Son, Inc., Chicago, Illinois
Sears, Roebuck and Company, Chicago, Illinois
Shamban, W. S., and Company, Los Angeles, California
Sinclair-Koppers Company, Monaca, Pennsylvania
Sloane, R. and G., Manufacturing Division, Sun Valley, California
Sutton Supply, Inc., Portland, Maine
Swanson Company, The, Fresno, California
Tampa Wholesale Plumbing Supply Corporation, Tampa, Florida
Union Carbide Corporation, New York, New York
United Pipe and Supply Company, Inc., Eugene, Oregon
United States Steel Corporation, Pittsburgh, Pennsylvania
Wank, Adams and Slavin, Office of Fellheimer and Wagner, New York, New York

GOVERNMENT

Agriculture, Department of, Washington, D. C.
Arizona State Department of Health, Phoenix, Arizona
General Services Administration, Washington, D.C.

Navy, Department of the, Naval Ship Systems Command, Annapolis, Maryland

Housing and Urban Development, Department of, Washington, D.C.
National Park Service, USDI, Washington, D.C.

TO THE ACCEPTOR

The following statements answer the usual questions arising in connection with the acceptance and its significance.

1. *Enforcement.*—A Product Standard contains requirements which are voluntarily established by mutual consent of those concerned. They present a common basis of understanding between the producer, distributor, and user or consumer and should not be confused with any plan of governmental regulation or control. The National Bureau of Standards has *no* regulatory power in the enforcement of their provisions, but since they represent the will of the interested groups as a whole, their provisions soon become established as trade customs, and are made effective through incorporation into sales contracts, labels, invoices, and the like.

2. *The Responsibility of the Acceptor.*—The purpose of a Product Standard is to establish, for specific items, nationally recognized sizes, grades, material requirements or performance criteria, and the benefits threrefrom will be measurable in direct proportion to their general recognition and actual use. Instances will occur when it may be necessary to deviate from the standard and the signing of an acceptance does not preclude such departures; however, such signature indicates an intention to follow the standard, where practicable, in the production, distribution, use or consumption of the product in question.

3. *The Role of the Department of Commerce.*—The National Bureau of Standards, acting under delegation from the Department of Commerce, provides (1) the function of unbiased coordinator to bring all interested parties together for the mutually satisfatcory development of a voluntary standard, (2) such assistance and advice as past experience with similar programs may suggest, (3) the determination of acceptability on the part of producers, distributors, and users or consumers, and (4) the publication of the standard for the information and guidance of buyers and sellers of the product.

WITHDRAWN

ACCEPTANCE OF PRODUCT STANDARD

PS 10–69, POLYETHYLENE (PE) PLASTIC PIPE (SCHEDULE 40—INSIDE DIAMETER DIMENSIONS)

If acceptance has not previously been filed, this sheet properly filled in, signed, and returned will provide for the recording of your organization as an acceptor of this Product Standard.

Date.....

Office of Engineering Standards Services
National Bureau of Standards
U.S. Department of Commerce
Washington, D.C. 20234

Gentlemen:

We believe that this Product Standard constitutes a useful standard of practice, and we individually plan to utilize it as far as practicable in the

production [1] distribution [1] use [1] testing [1]

of this commodity.

We reserve the right to depart from the standard as we deem advisable.

We understand, of course, that only those articles which actually comply with the standard in all respects can be identified or labeled as conforming thereto.

Signature of authorized officer.....
(In ink)

(Cut on this line)

(Kindly typewrite or print the following lines)

Name and title of above officer.....

Organization .....
(Fill in exactly as it should be listed)

Street address .....

City, State and Zip Code.....

---

[1] Underscore the applicable words. Please see that separate acceptances are filed for all subsidiary companies and affiliates which should be listed separately as acceptors. In the case of related interests, trade associations, trade papers, etc., desiring to record their general support, the words "General support" should be added after the signature.

U.S. DEPARTMENT OF COMMERCE • Maurice H. Stans, Secretary

NATIONAL BUREAU OF STANDARDS • Lewis M. Branscomb, Director

The National Bureau of Standards [1] was established by an act of Congress March 3, 1901. Today, in addition to serving as the Nation's central measurement laboratory, the Bureau is a principal focal point in the Federal Government for assuring maximum application of the physical and engineering sciences to the advancement of technology in industry and commerce. To this end the Bureau conducts research and provides central national services in four broad program areas. These are: (1) basic measurements and standards, (2) materials measurements and standards, (3) technological measurements and standards, and (4) transfer of technology.

The Bureau comprises the Institute for Basic Standards, the Institute for Materials Research, the Institute for Applied Technology, the Center for Radiation Research, the Center for Computer Sciences and Technology, and the Office for Information Programs.

THE INSTITUTE FOR BASIC STANDARDS provides the central basis within the United States of a complete and consistent system of physical measurement; coordinates that system with measurement systems of other nations; and furnishes essential services leading to accurate and uniform physical measurements throughout the Nation's scientific community, industry, and commerce. The Institute consists of an Office of Measurement Services and the following technical divisions:

Applied Mathematics—Electricity—Metrology—Mechanics—Heat—Atomic and Molecular Physics—Radio Physics [2]—Radio Engineering [2]—Time and Frequency [2]—Astro-physics [2]—Cryogenics.[2]

THE INSTITUTE FOR MATERIALS RESEARCH conducts materials research leading to improved methods of measurement standards, and data on the properties of well-characterized materials needed by industry, commerce, educational institutions, and Government; develops, produces, and distributes standard reference materials; relates the physical and chemical properties of materials to their behavior and their interaction with their environments; and provides advisory and research services to other Government agencies. The Institute consists of an Office of Standard Reference Materials and the following divisions:

Analytical Chemistry—Polymers—Metallurgy—Inorganic Materials—Physical Chemistry.

THE INSTITUTE FOR APPLIED TECHNOLOGY provides technical services to promote the use of available technology and to facilitate technological innovation in industry and Government; cooperates with public and private organizations in the development of technological standards, and test methodologies; and provides advisory and research services for Federal, state, and local government agencies. The Institute consists of the following technical divisions and offices:

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THE CENTER FOR COMPUTER SCIENCES AND TECHNOLOGY conducts research and provides technical services designed to aid Government agencies in the selection, acquisition, and effective use of automatic data processing equipment; and serves as the principal focus for the development of Federal standards for automatic data processing equipment, techniques, and computer languages. The Center consists of the following offices and divisions:

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THE OFFICE FOR INFORMATION PROGRAMS promotes optimum dissemination and accessibility of scientific information generated within NBS and other agencies of the Federal Government; promotes the development of the National Standard Reference Data System and a system of information analysis centers dealing with the broader aspects of the National Measurement System, and provides appropriate services to ensure that the NBS staff has optimum accessibility to the scientific information of the world. The Office consists of the following organizational units:

Office of Standard Reference Data—Clearinghouse for Federal Scientific and Technical Information [3]—Office of Technical Information and Publications—Library—Office of Public Information—Office of International Relations.

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[1] Headquarters and Laboratories at Gaithersburg, Maryland, unless otherwise noted; mailing address Washington, D.C. 20234.

[2] Located at Boulder, Colorado 80302.

[3] Located at 5285 Port Royal Road, Springfield, Virginia 22151.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1970 O—372-259

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DEPARTMENT OF COMMERCE
NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
OFFICE OF STANDARDS SERVICES

PRODUCT STANDARD PS10-69

POLYETHYLENE (PE) PLASTIC PIPE
(SCHEDULE 40--INSIDE DIAMETER DIMENSIONS)

Product Standard PS10-69, Polyethylene (PE) Plastic Pipe (Schedule 40--Inside Diameter Dimensions), [**supersedes** Commercial Standard CS197-65, Flexible Polyethylene Plastic Pipe], was withdrawn by the Department of Commerce on September 9, 1974.

PS10-69 was replaced by ASTM D2104, Standard Specification for Polyethylene (PE) Plastic Pipe, Schedule 40. This standard is under the jurisdiction of ASTM Committee F17 on Plastic Piping Systems, and is the direct responsibility of Subcommittee F17.26 on Olefin Based Pipe. The Committee Staff Manager can provide contacts for the subcommittee, technical information and assistance.

CONTACT: **Committee F17 Staff Manager**
American Society for Testing and Materials (ASTM)
1916 Race Street
Philadelphia, Pennsylvania 19103, USA
Telephone: (215) 299-5518
General Inquiries and Orders: (215) 299-5585
Fax: (215) 977-9679

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The sponsor for PS10-69 was the Plastics Pipe Institute (PPI), a division of the Society of the Plastics Industry (SPI).

For further assistance and information, contact:

Plastics Pipe Institute (PPI)
155 Route 46 West
Wayne, New Jersey 07470, USA
Telephone: (201) 812-9076
Fax: (201) 890-7029